Activity: **4.8**
Select Design Methodology

Responsibility: Project Team

Description: A systematic approach for building the functional and system designs for the software product simplifies the process and results in a software product that is testable, reliable, and maintainable. A complete design methodology includes the following elements:

- A methodology that is compatible with the requirements analysis methodology and any automated tools used by the project team.
- Straightforward rules that relate information obtained during requirements analysis to a distinct software structure.
- Design standards that comply with the site's current software engineering practices, the system owner organization's standards, and the constraints imposed by the software and hardware tools used by the project team.
- A practical approach to design that is amenable to a wide variety of software products.
- The development of small, intermediate design products that can be used to measure quality and progress.
- An evolution process from functional to system design.
- Well-defined measures to assess the quality of the design.
- Guidance on how to detect and correct design features that reduce maintainability and reusability.

The value of a design methodology can be significantly enhanced by automated tools that directly support the methodology. Automated tools provide assistance in generating, maintaining, and analyzing design diagrams and data dictionaries. The use of such tools typically results in a design that is easier to maintain, higher in quality, and more complete than designs produced without automated tools. The increased quality leads to significant productivity gains during software programming and testing.

Sample Design Methods: The following are examples of some common design methodologies.

- Function-oriented design methods model the software product by breaking it into components, identifying the inputs required by those components, and identifying the outputs produced by them. Function-oriented design methods include structured analysis and structured design. The major models or design representations used by this method are data flow diagrams, data dictionaries, structure charts, and process specifications.

- Data-oriented design methods use program structures that are derived from the data structures. Tree diagrams are typically used to represent both the data and the program structures.

- Object-oriented design methods produce a software architecture based on the objects manipulated by systems or subsystems rather than by functions. An object-oriented design closely resembles a model of reality since it captures the real-world objects and the operations taken by or upon them. The design structure tends to be layers of abstraction where each layer represents a collection of objects with limited visibility to other layers.

Work Product: Create a description of the design methodology and distribute it to the project team, system owner, and users. Place a copy of the design methodology description in the Project File.

Review Process: Conduct a structured walkthrough to verify that the design methodology is appropriate for the scope and objectives of the project. A structured walkthrough is not needed when the methodology has been used successfully on similar projects for the same system owner/user computing environment.